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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/518,638	11/21/2005	Jean-Yves Cavaille	032013-109	5360

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EXAMINER	
DOUYETTE, KENNETH J	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/518,638	CAVAILLE ET AL.	
	Examiner	**Art Unit**	
	KENNETH DOUYETTE	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 25 November 2009.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,3-7 and 9-35 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,3-7 and 9-35 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Claims 1, 3-7, and 9-35 are pending in the application.

2. Previous objections to the specification have been removed.

3. New grounds of rejection have been introduced.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1, 3-7, 9-13, 18, 20-22, 26-28, 31, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Callahan et al. (US 2002/0010261) in view of Cantiani et al. (WO 0015887, citations in English from US 6,703,497) and further in view of Fukutomi et al. (EP 1031598).

Regarding claim 1, Callahan et al. discloses an ionic conduction material comprising a polymer matrix ([0020]), at least one ionic species ([0020]) and at least one reinforcing agent ([0064]), wherein:

- the polymer matrix ([0020]) is a solvating polymer ([0021]) optionally having a **polar character** ("charge transfer compounds", [0065]), a non-solvating polymer carrying acidic ionic groups, or a mixture of a solvating or non-solvating polymer and an aprotic polar liquid;

- the ionic species ([0020]) is either an **ionic compound selected from salts and acids** ([0064]), said compound being in solution ([0064]) in the polymer matrix ([0020]), or an anionic or cationic ionic group fixed by covalent bonding on the polymer, or a combination of the two;
- the reinforcing agent is a cellulosic material ([0064]).

Callahan et al. does not disclose the reinforcing material is comprised of cellulose single crystals or of cellulose microfibrils.

Cantiani et al. discloses a reinforcing material (Abstract) for a battery (C10/L61) comprising cellulose microfibrils (Abstract). This configuration provides advantageous mechanical properties to a structure into which it is incorporated (C1/L35-38).

Cantiani et al. and Callahan et al. are analogous since both deal in the same field of endeavor, namely, reinforcing materials for electrical device components.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the cellulose microfibrils as disclosed by Cantiani et al. into the composition of Callahan et al. to enhance the mechanical properties of the composition.

Callahan et al. does not disclose polymer matrix is comprised of a non-solvating polymer carrying acidic ionic groups, wherein the non-solvating polymer carries alkylsulfonic groups or arylsulfonic groups or perfluorosulfonic groups or perfluoro-carboxylic groups.

Callahan et al. and Fukutomi et al. are analogous since both deal in the same field of endeavor, namely, ion conducting materials for use in electrochemical devices.

Fukutomi et al. discloses an ion selective membrane (Abstract) comprising a reinforced matrix material and polymer component ([0009]) carries alkylsulfonic groups ([0016]) or arylsulfonic groups ([0016]). The polymer imparts solvent resistance and waterproofness to the membrane ([0022]). This is chemically stable and has superb durability against hydrolysis and oxidative degradation ([0022]).

Callahan et al. and Fukutomi et al. are analogous since both deal in the same field of endeavor, namely, ion conducting materials for use in electrochemical devices.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the solvent resisting polymer component carrying alkylsulfonic or arylsulfonic groups as disclosed by Fukutomi et al. in the ionic conductive material of Callahan et al. to impart chemical stability and superb durability against hydrolysis and oxidative degradation to the ionic conductive material to enhance performance.

Regarding claim 3, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the proportion of reinforcing agent is between 0.5% and 70% by weight ([0064]).

Regarding claim 4, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the proportion of reinforcing agent is between 1% and 10% by weight ([0064]).

Regarding claim 5, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the polymer matrix is comprised of a crosslinked ([0021]) or non-crosslinked solvating polymer ([0021]).

Regarding claim 6, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the solvating polymer ([0021]) carries grafted ionic groups ([0054], [0055], [0056]).

Regarding claims 7 and 27-28, Callahan et al. discloses all of the claim limitations as set forth above but does not disclose polymer matrix is comprised of a non- solvating polymer carrying acidic ionic groups, wherein the non-solvating polymer carries alkylsulfonic groups or arylsulfonic groups or perfluorosulfonic groups or perfluoro-carboxylic groups.

Fukutomi et al. discloses an ion selective membrane (Abstract) comprising a reinforced matrix material and polymer component ([0009]) carries alkylsulfonic groups ([0016]) or arylsulfonic groups ([0016]). The polymer imparts solvent resistance and waterproofness to the membrane ([0022]). This is chemically stable and has superb durability against hydrolysis and oxidative degradation ([0022]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the solvent resisting polymer component carrying alkylsulfonic or arylsulfonic groups as disclosed by Fukutomi et al. in the ionic conductive material of

Callahan et al. to impart chemical stability and superb durability against hydrolysis and oxidative degradation to the ionic conductive material to enhance performance.

Regarding claim 9, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the polymer matrix ([0020]) is comprised of a mixture of **solvating** ([0021]) or non-solvating polymer and at least one aprotic polar liquid (“unsaturated amide”, [0063]).

Regarding claim 10, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the aprotic polar liquid (“unsaturated amide”, [0063]) is selected from the qroup consistinq of linear ethers and cyclic ethers, linear acetals and cyclic acetals, linear carbonates and cyclic carbonates, esters, nitriles, nitrated derivatives, **amides** ([0063]), sulfones, sulfolanes, alkyl-sulfamides and partially halogenated hydrocarbons.

Regarding claim 11, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the polymer is a non-solvating polymer selected from the .qroup consistinq of polymers which have polar groups (“anionic polysulfone”, [0064]) and which comprise units containing at least one heteroatom selected from **sulfur** ([0064]), nitrogen, oxygen, phosphorus, boron, chlorine and fluorine.

Regarding claim 12, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the ionic compound is selected from the .qroup consistinq_of **strong acids** ("perchloric acid", [0027]) and from **salts of alkali metals** ("KOH", [0077]), alkaline-earth metals, transition metals, rare earths, organic cations and organometallic cations of said acids.

Regarding claim 13, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the ionic compound is selected from the .qroup consistinq of_perchloric acid, **phosphoric acid** ("perchloric acid", [0027]), perfluoro-sulfonic acids, trifluorosulfonylimide acid, tris(perfluorosulfonyl)methane acid, perfluoro-carboxylic acids, arylsulfonic acids, perfluoro-sulfonimides and arylsulfonimides, and from **salts of said acids** ([0064]).

Regarding claim 18, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses an electronically conductive material ("conductive glass", [0029]) and an active material ("platinum", [0044]) performing as a catalyst ("inert", [0044]).

Regarding claim 20, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the active material is platinum ([0044]) or a platinum alloy.

Regarding claim 21, modified Callahan et al. discloses an electrode for a fuel cell ([0022]), comprising a composite material ([0044]) as set forth above.

Regarding claim 22, modified Callahan et al. discloses an electrolyte for a lithium-polymer battery ([0042]), in which the negative electrode ("anode", [0043]) is comprised of metallic lithium ([0043]), and a material ([0046]) as set forth above.

Regarding claim 26, modified Callahan et al. discloses an electrolyte of a membrane fuel cell ([0022]), comprised of an ionic conduction material ([0020]) as set forth above.

Regarding claim 31, modified Callahan et al. discloses an electrochromic glazing ([0016]) comprising two electrodes ([0017]) separated by an electrolyte ([0017]), wherein the electrolyte is an ionic conduction material ([0020]) as set forth above in which the ionic compound is an acid ([0021]).

Regarding claim 35, modified Callahan et al. discloses an electrode for a fuel cell ([0022]), comprising a composite material ([0020]), wherein the composite material ([0020]) is a material as set forth above.

6. Claims 14-17, 19, and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Callahan et al. (US 2002/0010261) in view of Cantiani et al. (WO

0015887, citations in English from US 6,703,497) and Fukutomi et al. (EP 1031598) as applied to claims 1 and 18 above and further in view of Hirakawa et al. (5,281,495).

Regarding claims 14 – 15, and 19, Callahan et al. discloses all of the claim limitations as set forth above and also discloses an insertion material ([0048]), but does not disclose an electronically conductive material in addition to the disclosed insertion material.

Hirakawa et al. discloses a rechargeable battery (Abstract) comprising electrodes with conductive layers in the form of carbon powder (C5/L29-30) and active (insertion) layers (C4/L5-12). The conductive layers help improve cell and cycle characteristics (C3/L55-57).

Hirakawa et al. and Callahan et al. are analogous since both deal in the same field of endeavor, namely, materials used in electrochemical cells.

It would have been obvious to one of ordinary skill in the art at the time of the invention to include carbon powder as a conductive material as disclosed by Hirakawa et al. into the ionic conductive material of Callahan et al. to improve cell and cycle characteristics of the electrical device into which the material is disposed of.

Regarding claim 16, modified Callahan et al. discloses all of the claim limitations as set forth above and also discloses the insertion material ([0048]) is an oxide of a metal selected from cobalt, nickel, **manganese** ([0048]), vanadium and titanium, or an iron phosphate or a graphitic compound.

Regarding claim 17, 32 and 33, modified Callahan et al. discloses an electrode for a battery ([0022]), comprisinq a composite material ([0020]), wherein the composite material ([0020]) is a material as set forth above.

Regarding claim 34, modified Callahan et al. discloses an electrode for a fuel cell ([0022]), comprising a composite material ([0020]), wherein the composite material ([0020]) is a material as set forth above.

7. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Callahan et al. (US 2002/0010261) in view of Cantiani et al. (WO 0015887, citations in English from US 6,703,497) and Fukutomi et al. (EP 1031598) as applied to claim 22 above and further in view of Nielsen et al. (US 2002/0037945).

Regarding claim 23, Callahan et al. discloses all of the claim limitations as set forth above but does not disclose the polymer matrix of the ionic conduction material is comprised of an amorphous one-dimensional copolymer or of an amorphous three-dimensional polyether network.

Nielseni et al. discloses a polymer matrix material ([0042]) comprised of an amorphous one-dimensional copolymer ([0061]). This material acts to provide a polymer matrix material ([0042]) with superior adhesive properties ([0028]).

Nielsen et al. and Callahan et al. are analogous since both deal in the same field of endeavor, namely, polymer matrix materials.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the amorphous one-dimensional copolymer of Nielsen et al. into the material of Callahan et al. to impart superior adhesive properties into the matrix, adhering the components together effectively thereby enhancing performance of electrochemical device into which it is incorporated.

8. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Callahan et al. (US 2002/0010261) in view of Cantiani et al. (WO 0015887, citations in English from US 6,703,497) and Fukutomi et al. (EP 1031598) as applied to claim 1 above and further in view of Tossici et al. (US 6,087,043).

Regarding claim 24, Callahan et al. discloses all of the claim limitations as set forth above and discloses an electrolyte for a lithium-polymer battery ([0022]), but does not disclose the negative electrode consists of lithiated graphite, and a material as set forth above.

Tossici et al. discloses lithium-polymer battery (Abstract) comprising a negative electrode (“anode”, C4/L12) containing a lithiated graphite (C14/L13-14) and an ionic conductive polymer (C6/L9-10). Batteries containing these electrodes have high energy densities compared to conventional batteries (C1/L54-56).

Tossici et al. and Callahan et al. are analogous since both deal in the same field of endeavor, namely, batteries.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the ionic conductive material of Callahan et al. into a lithiated

graphite battery as disclosed by Tossici et al. to impart a high energy density into the battery, enhancing performance.

Regarding claim 25, modified Callahan et al. discloses all of the claim limitations as set forth above but does not disclose the matrix of the ionic conduction polymer is comprised of a homo- or copolymer of vinylidene fluoride, acrylonitrile, methacrylonitrile, alkyl acrylate, alkyl methacrylate or ethylene oxide.

Tossici et al. discloses an ionic conductive polymer binder, vinylidene fluoride (C6/L9-10), is used in an electrode. This material binds the active material to a substrate (C6/L11-14). Batteries containing these electrodes have high energy densities compared to conventional batteries (C1/L54-56).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate vinylidene fluoride as a binder as disclosed by Tossici et al. into the material of Callahan et al. to bind the active material to the electrode and impart a high energy density into the battery.

9. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Callahan et al. (US 2002/0010261) in view of Cantiani et al. (WO 0015887, citations in English from US 6,703,497) and Fukutomi et al. (EP 1031598) as applied to claim 1 above and further in view of Skotheim (US 4,442,185).

Regarding claim 29, Callahan et al. discloses all of the claim limitations as set forth above and that the ionic conductive material can be used in a variety of electrochemical

devices ([0003]), but does not explicitly disclose a solar cell comprising a photoanode and a cathode separated by electrolyte, the photoanode carrying a conductive glass, wherein the electrolyte is comprised of_an ionic conduction material as set forth above.

Skotheim discloses in Fig 1, a solar cell (Abstract) comprising a photoanode (ref 5) and a cathode (ref 6) separated by electrolyte (ref 3), the photoanode carrying a conductive glass (C16/L21-22), wherein the electrolyte (ref 3) is comprised of ionic polymer matrix material (C14/L31-32) containing cellulose (C14/L64).

Skotheim and Callahan et al. are analogous since both deal in the same field of endeavor, namely, electrochemical cells.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the ionic conductive material of Callahan et al. into a solar cell as disclosed by Skotheim to generate electrochemical energy to power electrical devices.

10. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Callahan et al. (US 2002/0010261) in view of Cantiani et al. (WO 0015887, citations in English from US 6,703,497) and Fukutomi et al. (EP 1031598) as applied to claim 1 above and further in view of Niu (US 6,205,016).

Regarding claim 30, Callahan et al. discloses all of the claim limitations as set forth above and that the ionic conductive material can be used in a variety of electrochemical devices ([0003]), but does not explicitly disclose a supercapacitor comprised of an electrochemical cell comprising two electrodes separated by an electrolyte, wherein the

electrolyte is an ionic conduction material as set forth above in which the ionic compound is a lithium or tetraalkylammonium salt, or an acid.

Niu discloses supercapacitor (C3/L36) comprised of an electrochemical cell (C9/L37-38) comprising two electrodes separated by an electrolyte (C9/39/40), wherein the electrolyte is an ionic ionic polymer matrix material (C17/L16-17) in which the ionic compound is a lithium or tetraalkylammonium salt (C9/L42), or an acid.

Niu and Callahan et al. are analogous since both deal in the same field of endeavor, namely, electrochemical cells.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the ionic conductive material of Callahan et al. into a supercapacitor as disclosed by Niu to generate electrochemical energy to power electrical devices.

Response to Arguments

11. Applicant's arguments with respect to claims 1-35 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KENNETH DOUYETTE whose telephone number is (571)270-1212. The examiner can normally be reached on Monday - Thursday 6am - 4:30pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on (571) 272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. D./
Examiner, Art Unit 1795

/Jonathan Crepeau/
Primary Examiner, Art Unit 1795